STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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October 2, 2012

Harvey and Wanda Estep
PO Box 4481
Wenatchee, WA 98801

Re: Seasonal Change Authorization No. CS4-061144CL (for 2012 season only).

Dear Mr. and Mrs. Estep:

DECISION: This one year SEASONAL CHANGE AUTHORIZATION to change the point of diversion (POD) and the place of use (POU) to the SW¼NW¼ Section 9, T. 26 N., R. 22 E.W.M, Okanogan County, for the irrigation of nine acres from April 1 to October 31, at a maximum instantaneous diversion rate of 0.32 cubic feet per second (cfs) and a maximum quantity of **31.97 acre-feet** (ac-ft) is granted subject to the following provisions. Additionally, **13.6 ac-ft** are placed into the State's Trust Water Rights Program as instream flows.

The trust water place of use extends downstream from the originally authorized point of diversion on the Methow River located within GL 3 of Section 24, T. 30 N., R. 22 E.W.M. to the general area of the proposed point of withdrawal located within the SW¼NW¼ Section 9, T. 26 N., R. 22 E.W.M. Trust water rates and quantities are as described below in the discussion under the heading "RCW 90.03.380 and RCW 90.03.390 (detriment or injury to existing rights)" and given in Table 1.

PROVISIONS:

Quantity Limits, Flow and Regulation

1. This change does not authorize an enlargement of the diversion rate in cfs or in number of total acres irrigated as described in Claim No. 061144.

2. The original place of use of Claim No. 061144 shall be fallowed for the duration of the 2012 irrigation season. Irrigation during the 2012 irrigation season (April 1 to October 31) in the original place of use of Claim No. 061144 (which claimed the use of up to 14 acres of irrigation) shall constitute a violation of the terms of this authorization, and will result in its immediate termination. Other enforcement actions, including but not limited to fines and/or penalties, may also follow as a result of a violation.

3. The diversion rate in cfs, the annual quantity in ac-ft, and the number of total acres irrigated, transferred and placed into Trust under this authorization are shared with change authorization No. CS4-SWC 02663. Until the validity and extent of Claim No. 061144 are determined by a Superior Court, or the subject rights determined under an

As mentioned above, the POU is shared with a Water Right Certificate No. SWC 02663, also proposed for transfer to the same proposed POU. As Claim No. 061144 has not yet undergone a validity and extent review by a Superior Court, any primary/secondary relationship with No. SWC 02663 that may exist has not been determined. Ecology lacks the authority to determine the validity and extent of claims. As such, water available for transfer is considered to have been applied under one or the other document, but not both. Once transferred, water may not be applied in the original POU for the duration of the 2012 irrigation season.

In the event water use data is not available, the Washington Irrigation Guide (WIG) can be used to estimate how much water a specific crop requires in a geographic area. The closest data station to the subject area is the town of Methow. Mark Miller, agent for the applicants and the Stennes', indicates that apples with cover were grown in the area of the original POU, irrigated by undertree impact sprinklers. The WIG indicates that apples with cover in this area require 31.25 inches/acre, which does not account for irrigation inefficiencies. From Ecology's Guide 1210, the sprinklers were likely around 75% efficient. As such, approximately 39.06 inches/acre (31.25 + (31.25 * 25%)) were applied to this apple orchard, which converts to 3.26 feet/acre. Over 14 acres, then, approximately 45.57 ac-ft were applied to beneficial use and would be available for change.

Though the application lists ten acres, digital mapping of the extent of the proposed POU delineated approximately nine acres of irrigated area. The applicant indicates that some cherries but mostly apples are being grown, irrigated by undertree sprinklers. The WIG shows that apples in the Chelan area require 34.10 inches per acre. This value does not account for irrigation inefficiencies. Ecology's Guide 1210 estimates that undertree sprinklers are typically 75% efficient. As such, 8.53 inches per acre are added for a total of 42.63 inches per acre (3.55 feet per acre). Nine acres of apples with cover in the Chelan area irrigated with undertree sprinklers would then require approximately **31.97 ac-ft** of water seasonally.

Any surplus water is requested to be placed into Trust. From the above discussion, it appears water availability exceeds need at the proposed place of use by approximately 13.6 ac-ft (45.57 – 31.97). This surplus water, **13.6 ac-ft**, will be placed in Trust. Under RCW 90.03.380, the action of adding a purpose of use triggers an Annual Consumptive Quantity (ACQ) test. The most recent five-year period of continuous use are the years 2002-2006. From aerial photography and satellite imagery, water use on the entire 14 acres appears to have occurred. All five years are assumed to have used essentially equal quantities of water that closely approximate the 45.57 ac-ft estimate given above. As such any "two years of greatest use" of years 2002-2006 could be selected as years to average. In this case, the ACQ test equals the water use estimate given in the previous paragraph and 13.6 ac-ft would be available to be placed into Trust.

The season of use entered on Claim No. 061144 is "April thru October", and the applicants have entered April 1 through October 31 for the season of use. No change from normal irrigation scheduling is expected.

RCW 90.03.380 and RCW 90.03.390 (detriment or injury to existing rights):

This change application proposes to move the POD for Claim No. 061144 approximately nine miles downstream along the Methow and then 27 miles downstream along the Columbia

River. From the Hydrogeologic Analysis below, the proposed POW would capture groundwater in close connection with Lake Entiat (backwater held by Rocky Reach Dam on the Columbia River). Since 2012 is expected to be a high water year and potential regulation under Chapter 173-563 WAC was not triggered by the this years March 1 forecast, transferring nine acres worth of irrigation under Claim No. 061144 downstream should not reduce the availability of water to intervening water users and downstream water users this year.

Due to the distance involved in this temporary change proposal, the proposed change involves the temporary conveyance of the right into the trust water right program (TWRP) as instream flow. The place of use of the right conveyed into the TWRP would extend from the original point of diversion on the Methow River to the general area of the proposed point of withdrawal on the Columbia River. This conveyance, if exercised, would allow Ecology to protect the water right quantities along this distance from potential withdrawal by other users and ensure that the water right quantities are available at the proposed point of withdrawal. The 13.6 ac-ft resulting from the ACQ analysis that travels from the original point of diversion to the point of withdrawal under this change authorization that would be conveyed into trust can be distributed on a monthly basis similar to the way it was consumed by the crops at the original place of use. In this case, distribution is in proportion to the crop duty provided in the Washington Irrigation Guide for the Methow area (see Table 1 below and the *tentative determination of extent and validity* section above). The bottom row represents the instantaneous rate in cfs calculated as a continuous diversion of the monthly volume (the second row from the bottom).

Table 1: Trust Water Calculations

	May	June	July	August	September	October	Total
WIG apples w/cover	2.60	7.41	9.71	6.85	4.37	0.31	31.25
% of WIG total	8.3%	23.7%	31.1%	21.9%	14.0%	0.9%	99%
WIG % of 13.6 ac-ft	1.13	3.22	4.23	2.98	1.9	.12	13.58
13.6 ac-ft converted to monthly cfs	0.002	0.004	0.006	0.004	0.003	0.0002	N/A

This temporary change would not increase the diversion limits given on Claim No. 061144.

The proposed change involves a surface water being transferred to a groundwater withdrawal. The following is an excerpt from a hydrogeological report authored by a licensed Hydrogeologist specific to this change request:

Under current policies of the Water Resources Program a change in water source from surface water to groundwater can only occur if the proposed groundwater source and original surface water source are hydraulically connected to such a degree that the water right can be

administratively managed according to the existing regulatory framework for the water right being transferred. In addition, such transfers require that there be no detriment or injury to existing water rights. The degree of hydraulic connection and possible injury to existing water rights at the proposed groundwater withdrawal site are addressed in the following sections of this memorandum.

Hydrogeologic Setting:

An existing well is proposed for use under the subject Change Applications. The existing well, located approximately 800 feet from the Columbia River in Section 9, Township 26 North, Range 22 East, is 8 inches in diameter and drilled to a depth of 66 feet below the ground surface (bgs). Surficial geologic mapping of the area indicates there are flood-deposited sediments in the area of the subject well (WDNR, 2012). There are no mapped geologic faults or folds in the vicinity of the subject well. A well log on file with Ecology indicates that the subject well was completed in unconsolidated silt, sand, and gravel sediments. A search of well logs on file with Ecology indicates that there are at least 16 existing water wells within 2,000 feet of the subject well. Like the subject well, these wells penetrate silt, sand, and gravel. Selected attributes of each well, including the subject well, are presented in Table 1 below. The subject well was located using field-collected global positioning system (GPS) latitudes and longitudes (NAD 83 Datum). All other wells were located using county parcel ownership information, or water right information, or quarter-quarter section information. The static water level (swl) for each well, as recorded on the well log, is shown in Table 1 along with the reported well depth and the estimated swl elevation above mean seal level (msl).

Approximately 23 miles downstream at river mile 473.7 Rocky Reach Dam raises the elevation of the Columbia River creating a reservoir known as Lake Entiat. Lake Entiat extends upstream to the base of Wells Dam at river mile 515.8. Normal full pool elevation for Lake Entiat is 707 feet above msl and normal low pool elevation is 703 feet above msl (University of Washington, 2012). As noted in Table 1 most of the reported static water levels are similar in elevation to that of Lake Entiat. Similar groundwater elevations between the unconsolidated sand and gravel aquifer and the river suggest that the two water bodies are in close hydraulic communication.

Table 1

Name of Record	Hole Depth (ft.)	Estimated Well Elevation	SWL (ft.)	SWL Date	Approximate SWL Elevation
HARVEY ESTEP	66	755	48	2/1/1984	707
JEFF HEUPLE	40	720	14	3/13/2009	706
S A FAULKENBERRY	45	740	33	Aug., 1969	707
DEVLIN / FURLONG	67	740	35	9/6/1997	705
DEVLIN / FURLONG	67	740	35	9/8/1997	705
DEVLIN / FURLONG	67	740	35	9/8/1997	705
DEVLIN / FURLONG	67	740	35	9/10/1997	705
DEVLIN FURLONG	67	740	35	9/11/1997	705
DEVLON FURLONG	67	740	35	9/6/1997	705
DOUG TUENGEL	65	740	35	11/7/2008	705

NAUMES, INC.	67	740	36	12/11/1997	704
PERRY CLEWS	67	740	35	11/4/2008	705
RICH PALMER	48	730	21	4/5/2004	709
TIM DEVLIN	46	740	23	3/5/2003	717
TODD JORDANA	48	720	18	4/12/2004	702
TODD JORDANA	65	740	35	11/6/2009	705
T. R. BALLARD ORCHARDS	80	745	NA	NA	NA

Relationship between the Original Source and Proposed Source:

Squaw Creek and the Methow River are the authorized sources of water under the subject water right and claim. Squaw Creek discharges to the Methow River which in turn discharges to the Columbia River. The proposed well is completed in shallow unconsolidated flood-deposited sediments that have a high degree of hydraulic connection to the Columbia River. This determination is based on the proximity of the well to the Columbia River, well depth, the composition of the unconsolidated sediments, geologic mapping, estimation of hydraulic parameters for the aquifer, and the similarity in water levels recorded in area wells when compared to the water level of the Columbia River. Therefore, if water is not diverted at the original points of diversion, it will be available for withdrawal from the proposed subject well.

Impairment Analysis:

Washington Administrative Code (WAC) Chapter 173-150 defines the policies and procedures by which holders of groundwater rights (senior rights) within the state are afforded protection from new withdrawals. Specifically, WAC 173-150-060 states, in part, that impairment occurs when there is an interruption or interference in the availability of water caused by the withdrawal of groundwater by a junior water right holder.

Under the proposed transfer the applicant intends to transfer 32 acre feet (af) of irrigation water to the property in Chelan County. The maximum instantaneous pumping rate proposed under the transfer is 0.32 cfs or approximately 145 gallons per minute (gpm). An evaluation of possible pumping interference with nearby wells, as a result of the permitting action, was accomplished using the Theis non-equilibrium equation, corrected for unconfined conditions, and the parameters listed below. Results indicate that pumping the authorized maximum instantaneous quantity of 145 gallons per minute (gpm) would exhaust the authorized annual quantity of 32 acre-feet (af) in approximately 50 days and potentially drawdown the water table an estimated 1.0 feet at a distance of 100 feet from the pumping well. Based on 2011 aerial photos of the area and 2012 property ownership information, it is estimated that the subject well is at least 300 feet or more from the nearest identified water well. Estimated drawdown of the hydraulic head in the unconsolidated sand and gravel aquifer at a distance of 300 feet is estimated to be approximately 0.7 feet. If the well is pumped in cycles or if it is pumped at less than the maximum instantaneous quantity, the predicted drawdown effect in the unconsolidated sand and gravel aquifer would be reduced.

Modeled Parameters:

Pumping Rate – 145 (gpm)
Annual quantity – 32 (af)
Transmissivity – 112,000 ft^2/day
Hydraulic Conductivity – 5,600 (gallons/day/square foot)
Saturated Thickness – 20 (feet)
Aquifer Specific Yield – 0.25 (dimensionless)

Conclusions & Recommendations:

Groundwater flows from areas of high hydraulic head (high groundwater elevation) to areas of low hydraulic head (low groundwater elevations). In general, groundwater discharges to surface water bodies, such as the Columbia River, when the groundwater head is higher than the surface water head, and surface water bodies recharge groundwater when the surface water head is higher than the groundwater head.

Based on the above analysis it appears that the groundwater elevation in the unconsolidated sand and gravel aquifer in this area is very similar to that of the Columbia River. Surficial geologic maps of the area show no hydrogeologic barriers between the Columbia River and the subject well site (WDNR, 2012). Recharge to the aquifer is primarily due to surface water exchange with the Columbia River when the river elevation is above that of the groundwater. Additional sources of recharge include direct precipitation, return flows from irrigation, runoff from upslope areas, and possibly discharge from underlying bedrock fractures. Discharge from the aquifer is to the Columbia River when and where the groundwater elevation is higher than the elevation of the river. The observations noted above indicate that the groundwater in the unconsolidated sand and gravel aquifer is hydraulically connected to the Columbia River.

The aquifer is comprised of highly permeable sands and gravels. As a result, the transmissivity of the aquifer is expected to be relatively high. The analytical modeling using the Theis equation indicates that any drawdown which may occur as a result of the permitting action is not expected to interfere with the ability of nearby well owners to fully utilize their well(s). Therefore, it is recommended that the subject change applications be approved.